MOTOROLA Service Manual

AUTO RADIO

SUPPLEMENT

SEARCH TUNER
TROUBLE SHOOTING CHART

FORD 69MF
FORD 69MS
MOPAR 916

GENERAL INFORMATION

The information in this manual supplements Search Tuner service information found in Ford Models 69MF and 69MS and Mopar Model 916 service manuals. It covers problems which are unique to search tuned radios and does not cover problems encountered in regular auto radios. These problems are divided into four groups:

1. PRELIMINARY for faulty operation when the power switch is turned on.

2. ERRATIC OPERATION for faulty operation which causes the tuner to sweep erratically.

3. STARTING for faults which cause the tuner to start improperly.

4. STOPPING for faults which cause the tuner to stop improperly.

CORRECTIONS FOR SERVICE MANUALS FOR FORD MODELS 69MF AND 69MS

On page 7 of these manuals, in paragraph number 5, the following statement is in error: "With switch E6 opened the bias is lowered while searching"; this should read: "With switch E6 opened the bias is increased while searching."

ADDITIONS TO SERVICE MANUAL FOR FORD MODELS 69MF AND 69MS

Two anti-rattle tubes have been added to the Model 69MF; one to the manual tuning shaft and the other to the volume control. On the Models 69MF and 69MS, Search Drive Gear and Plate Assemblies have been set up. These parts may be ordered under the following part numbers:

1K539506 Search Drive Gear and Plate Assembly (Model 69MF ST-162 --incls Carrier Gear Assem, Control Clutch, Armature Spring and Power Transfer Gears).. 2.70

1K539507 Search Drive Gear and Plate Assembly (Model 69MS ST-176 --incls same as above)..... 2.70

37K537832 Tube, anti-rattle: 1-24/64" long (69MF manual tuning shaft)..... .02

37A537831 Tube, anti-rattle: 1-61/64" long (69MF volume control)..... .02

SERVICE NOTES

1. SLIPPING CLUTCH

A slipping clutch is caused by one of two factors: a pushbutton does not pop out completely; or the clutch and disc assembly requires a slight adjustment.

PUSHBUTTON REMEDY - If one of the pushbutton arms are rough, the pushbutton will not pop completely out causing the clutch to slip. Pulling out and pushing in the pushbutton several times will wear off the roughness, allowing the pushbutton to function smoothly.

CLUTCH ADJUSTMENT - Loosen the setscrew on the clutch and disc assembly and position the clutch assembly against the split gears and bushing assembly so that the clutch is in firm engagement but will release when a pushbutton is depressed 3/32 of an inch.

2. COUPLING "S" SPRING REPLACEMENT

If the coupling "S" spring is jarred off the motor drive shaft or broken, replace as follows:

a. Remove the search tuner drive unit from radio (see Search Tuner Drive Unit Removal).

b. Remove the two motor mounting screws and remove the motor.

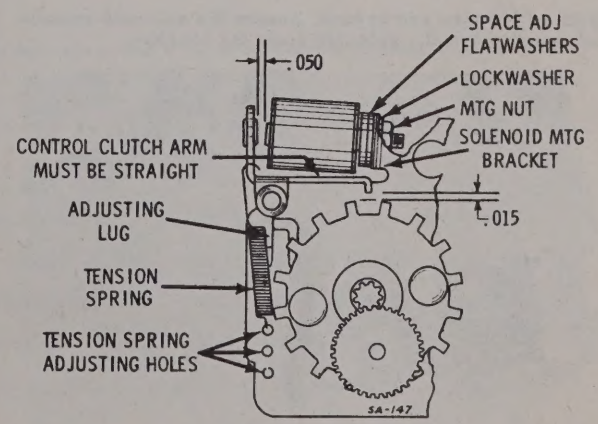
c. Install coupling "S" spring and re-mount the motor.

d. Re-install the search tuner drive unit in the radio.

3. CONTROL CLUTCH ADJUSTMENT

a. THE CONTROL CLUTCH SHOULD NOT BE OILED. To adjust the control clutch proceed as follows: to adjust the dimension between the tip of the control clutch and the carrier gear teeth, bend the adjusting lug until the dimension is as shown in illustration; to adjust the dimension between the control clutch and the solenoid, either add or remove a space adjusting washer until the dimension conforms to that shown in the illustration.

b. CONTROL CLUTCH TENSION SPRING ADJUSTMENT. The control clutch tension spring should apply the maximum amount of tension possible to the control clutch but allow the clutch to pull in with 10 volts at the input of the radio. The tension spring is adjusted by means of three adjusting holes (see illustration). To increase tension, move the spring to a lower hole; to decrease tension, move the spring to a higher hole.



CONTROL CLUTCH ADJUSTMENT

MOTOROLA INC. 4545 WEST AUGUSTA BLVD. · CHICAGO 51, ILLINOIS

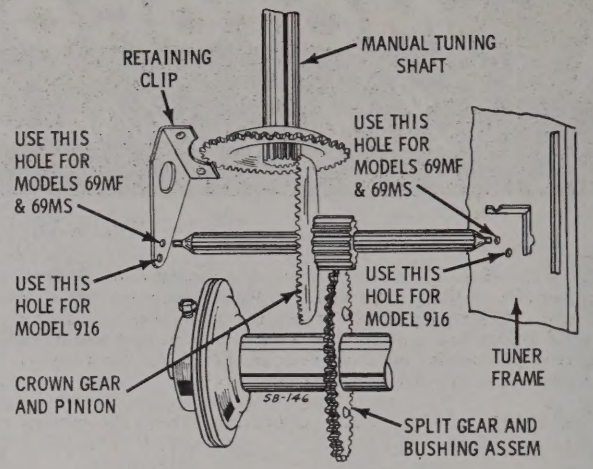
Part No. 68P538580 Price 10 Cents Printed in U.S.A.

4. CROWN GEAR ENGAGEMENT

To engage a crown gear and pinion assembly with the split gears and bushing assembly, reset the floating split gear 1/2 tooth so that it is in line with the fixed split gear; hold it in this position. Mesh the pinion gear (of the crown gear and pinion assembly) with the split gears (of the split gears and bushing assembly) and the crown gear with manual tuning shaft pinion gear. USE THE BEARING HOLES SHOWN IN THE ILLUSTRATION.

5. DRIVE MOTOR WIRING

In the event that the drive motor is replaced or unwired, when removing the search tuner drive unit from the radio, care should be exercised in rewiring the motor leads. If wired improperly, the motor will not reverse direction properly, and cause the tuner to stick at one end of the dial scale while the motor runs. To check, (NOTE: INPUT VOLTAGE SHOULD BE POSITIVE AT THE RADIO "A" LEAD) trip the motor reversing switch towards the rear of the radio, press a search selector button; the pointer should sweep towards the high end of the dial scale. If the pointer sweeps towards the low end of the dial scale with the motor reversing switch tripped towards the rear of the radio, reverse the motor leads.


RETAINING CLIP
MANUAL TUNING SHAFT
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USE THIS HOLE FOR MODEL 916
TUNER FRAME
CROWN GEAR AND PINION
SB-146
SPLIT GEAR AND BUSHING ASSEM

CROWN GEAR ENGAGEMENT

PARTS REPLACEMENT

SEARCH TUNER DRIVE UNIT REMOVAL

Mopar Model 916

To remove the search tuner drive unit from the radio for servicing, proceed as follows:

1. With a 1/4" open end wrench, loosen the solenoid mounting nut and remove the solenoid from its bracket.

2. Unsolder the two wires from the tuner drive motor.

3. Remove the two screws from the search tuner drive unit mounting plate.

4. Remove the search tuner drive unit from the radio by lifting the rear of the unit up and pulling out.

5. After re-installing the search tuner drive unit in the radio, check the following:

That the adjustment of the control clutch is as stated in Service Note No. 3a and 3b.

That the drive motor is wired as stated in Service Note No. 5.

Ford 69MF and 69MS

To remove the search tuner drive unit from the radio for servicing, proceed as follows:

1. With a 1/4" open end wrench, loosen the solenoid mounting nut and remove the solenoid from its bracket.

2. Unsolder the two wires from the tuner drive motor.

3. Unsolder the tuner grounding strap.

4. Remove three screws from the side of the radio housing.

5. Open the radio housing enough to allow working with an open end wrench.

6. Remove two screws from the search tuner drive unit mounting plate.

7. Remove the search tuner drive unit from the radio by lifting the rear end up and pulling out. (NOTE: It may be necessary to remove some of the wires connecting the tuner to the chassis.)

8. After the search tuner drive unit is in the radio, check the following:

That the adjustment of the control clutch is as stated in Service Note No. 3a and 3b.

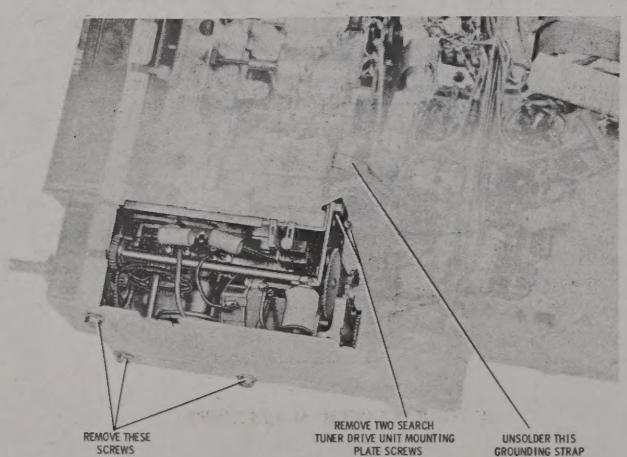
That the drive motor is wired as stated in Service Note No. 5.

TO REPLACE TUNER DRIVE SHAFT

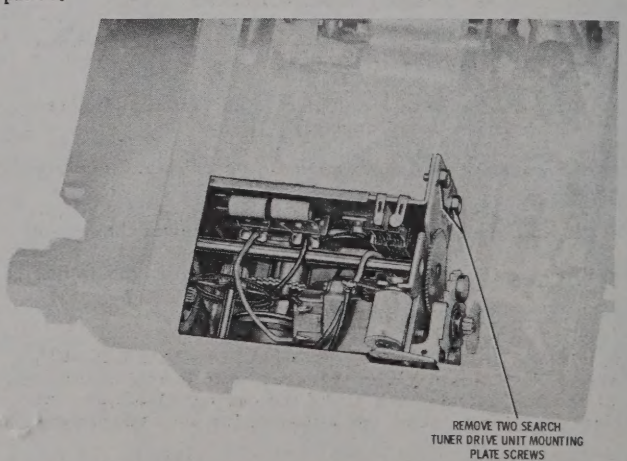
Mopar Model 916

1. Remove the search tuner drive unit as explained under Search Tuner Drive Unit Removal.

2. Remove the "C" washer holding the tuner drive shaft in place.



69MF & 69MS TUNER REMOVAL



916 TUNER REMOVAL

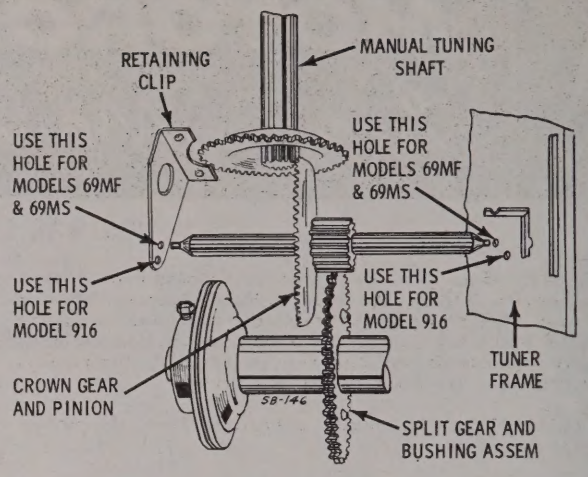
TEST	INDICATIONS & INSTRUCTIONS
	3. Tuner for mechanical bind 4. Drive motor incorrectly wired If tuner sweeps and sticks at any point midway between either end, check: 1. Tuner for mechanical bind If tuner sweeps but pointer movement is jerky, check: 1. Crown gear and pinion defective or disengaged 2. Clutch and disc assembly slipping (see Service Note No. 1) If tuner sweeps exceptionally fast or slow, check: 1. Motor speed control adjustment (see Motor Speed Adjustment in the Service Manual for either the 69MF, 69MS or the 916) 2. Input voltage of radio with radio installed in car
4. STOP-PING	Connect antenna and make sure that antenna trimmer is properly adjusted. Ford 69MF & 69MS only If tuner sweeps normally but stops on both weak and strong stations when operated with the TOWN search button, check: 1. Defective sensitivity switch E6 2. TOWN sensitivity control R15 misadjusted or shorted (for adjustment, see Alignment Chart in Service Manual for either the 69MF or the 69MS) If tuner sweeps normally but stops only on strong stations when operated with the COUNTRY search button, check: 1. Defective or dirty sensitivity switch E6 2. NORMAL sensitivity control misadjusted or open (for adjustment, see Alignment Chart in Service Manual for either the 69MF or the 69MS) 3. Proper adjustment of antenna trimmer 4. Poor or insufficient antenna MoPar 916 only If tuner sweeps normally it should stop only on strong stations when the sensitivity control is in its minimum position, on strong and medium powered stations with the control in its mid-position, and on all stations within the range of the radio with the control in its maximum position. If it does not stop as above, check: 1. Sensitivity switch for defect 2. Resistors R28 and R29 ALL MODELS: If tuner sweeps normally but fails to stop when operated with a search selector button, check: 1. RF, conv, IF and detector tubes 2. Proper adjustment of antenna trimmer 3. Poor or insufficient antenna 4. Value of bias network grounding resistor (Ford 69MF & 69MS R28 - MoPar 916 R31) 5. Pin 3 cathode resistor of 12AU7 (Ford 69MF & 69MS R29 - MoPar 916 R27) 6. IF coupling capacitor (Ford 69MF & 69MS C12 - MoPar 916 C11) 7. Pin 7 grid bias resistor of 12AU7 (Ford 69MF & 69MS R32 - MoPar 916 R32) 8. AVC voltage divider network resistor (Ford 69MF & 69MS R36 - MoPar 916 not used) 9. Pin 2 of 12AU7 for short to ground 10. Low sensitivity (see Alignment Chart in Service Manual for either the 69MF, 69MS or the 916) 11. Defective 12AU7 tube 12. Cathode of AVC tube for short

4. CROWN GEAR ENGAGEMENT

To engage a crown gear and pinion assembly with the split gears and bushing assembly, reset the floating split gear 1/2 tooth so that it is in line with the fixed split gear; hold it in this position. Mesh the pinion gear (of the crown gear and pinion assembly) with the split gears (of the split gears and bushing assembly) and the crown gear with manual tuning shaft pinion gear. USE THE BEARING HOLES SHOWN IN THE ILLUSTRATION.

5. DRIVE MOTOR WIRING

In the event that the drive motor is replaced or unwired, when removing the search tuner drive unit from the radio, care should be exercised in rewiring the motor leads. If wired improperly, the motor will not reverse direction properly, and cause the tuner to stick at one end of the dial scale while the motor runs. To check, (NOTE: INPUT VOLTAGE SHOULD BE POSITIVE AT THE RADIO "A" LEAD) trip the motor reversing switch towards the rear of the radio, press a search selector button; the pointer should sweep towards the high end of the dial scale. If the pointer sweeps towards the low end of the dial scale with the motor reversing switch tripped towards the rear of the radio, reverse the motor leads.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CROWN GEAR ENGAGEMENT

PARTS REPLACEMENT

SEARCH TUNER DRIVE UNIT REMOVAL

Mopar Model 916

To remove the search tuner drive unit from the radio for servicing, proceed as follows:

1. With a 1/4" open end wrench, loosen the solenoid mounting nut and remove the solenoid from its bracket.

2. Unsolder the two wires from the tuner drive motor.

3. Remove the two screws from the search tuner drive unit mounting plate.

4. Remove the search tuner drive unit from the radio by lifting the rear of the unit up and pulling out.

5. After re-installing the search tuner drive unit in the radio, check the following:

That the adjustment of the control clutch is as stated in Service Note No. 3a and 3b.

That the drive motor is wired as stated in Service Note No. 5.

Ford 69MF and 69MS

To remove the search tuner drive unit from the radio for servicing, proceed as follows:

1. With a 1/4" open end wrench, loosen the solenoid mounting nut and remove the solenoid from its bracket.

2. Unsolder the two wires from the tuner drive motor.

3. Unsolder the tuner grounding strap.

4. Remove three screws from the side of the radio housing.

5. Open the radio housing enough to allow working with an open end wrench.

6. Remove two screws from the search tuner drive unit mounting plate.

7. Remove the search tuner drive unit from the radio by lifting the rear end up and pulling out. (NOTE: It may be necessary to remove some of the wires connecting the tuner to the chassis.)

8. After the search tuner drive unit is in the radio, check the following:

That the adjustment of the control clutch is as stated in Service Note No. 3a and 3b.

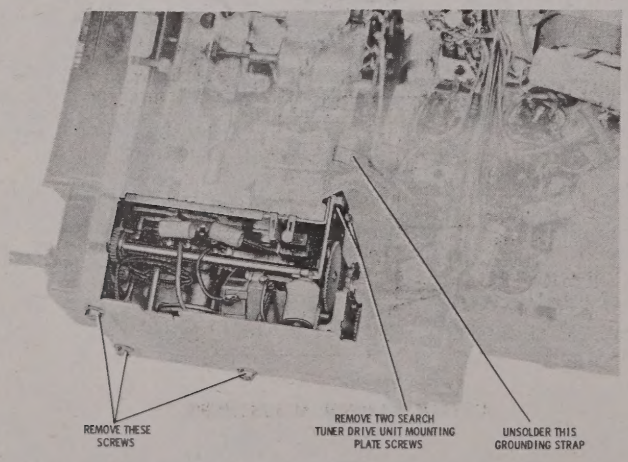
That the drive motor is wired as stated in Service Note No. 5.

TO REPLACE TUNER DRIVE SHAFT

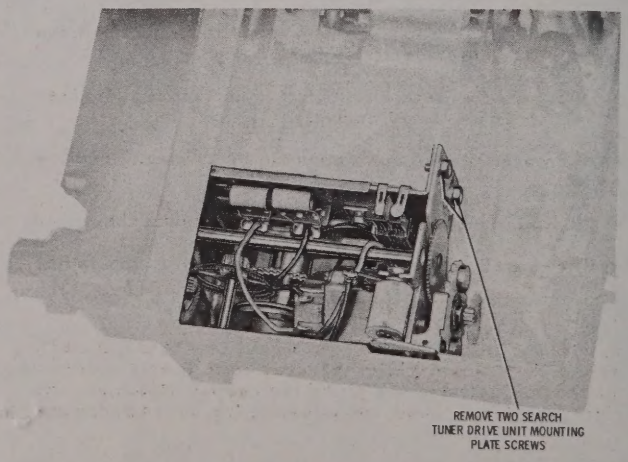
Mopar Model 916

1. Remove the search tuner drive unit as explained under Search Tuner Drive Unit Removal.

2. Remove the "C" washer holding the tuner drive shaft in place.



69MF & 69MS TUNER REMOVAL



916 TUNER REMOVAL

3. Slide the flat washer towards the front of the tuner.

4. Pull tuner drive shaft back slightly and slide out of slot.

5. Replace new shaft by reversing this procedure.

6. Check tuner drive shaft for at least 1/64" end play. If less, move slip clutch towards rear of tuner.

Ford 69MF and 69MS

1. Remove the search tuner drive unit as explained under Search Tuner Drive Unit Removal.

2. Remove the "C" washer holding the tuner drive shaft in place.

3. Slide the flat washer towards the front of the tuner.

4. Bend control clutch adjusting lug flat and swing control clutch out of way.

5. Pull tuner drive shaft back slightly and slide out of slot.

6. Replace new shaft in opposite manner.

7. Check tuner drive shaft for at least 1/64" end play. If less, move slip clutch towards rear of tuner.

8. Bend control clutch adjusting lug out.

TO REPLACE CARRIER GEAR ASSEMBLY

1. Remove the search tuner drive unit as explained under Search Tuner Drive Unit Removal.

2. With a small screwdriver, pry the carrier gear retaining ring off of the carrier gear bushing.

3. Remove the carrier gear assembly and flat washer.

4. Place new carrier gear assembly, flat washer and new retaining ring on carrier gear bushing.

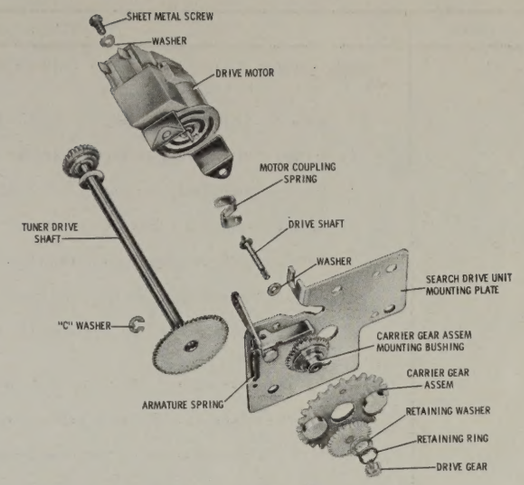
5. Tighten the carrier gear retaining ring on to the carrier gear assembly with a pair of long-nose pliers.

TO REPLACE DRIVE GEAR SHAFT

1. Remove the search tuner drive unit as explained under Search Tuner Drive Unit Removal.

2. Remove two motor mounting screws and remove the motor.

3. Remove the coupling "S" spring.



PARTS IDENTIFICATION

4. Pull pinion drive gear off the drive gear shaft and remove the drive gear shaft.

5. Place new drive gear shaft in place with its washer.

6. Press pinion gear on to the end of the drive gear shaft leaving .005 to .010 clearance between the pinion gear and the carrier gear assembly bushing.

7. Make sure that the pinion gear and shaft turns freely after assembly.

TO REPLACE PINION DRIVE GEAR

1. Remove search tuner drive unit as explained under Search Tuner Drive Unit Removal.

2. Pull pinion drive gear off of drive gear shaft.

3. Press new pinion gear on to drive gear shaft leaving .005 to .010 clearance between the pinion gear and the carrier gear assembly bushing.

4. Make sure that the pinion gear and shaft turns freely after assembly.

TROUBLE SHOOTING CHART – FORD 69MF AND 69MS – MOPAR 916

TEST	INDICATIONS & INSTRUCTIONS
1. PRELIMINARY	Check tubes and vibrator. Connect radio to power source as follows: radio "A" lead to positive (+) side; radio housing to negative (-) side. After warm-up, adjust input voltage to 14.4 volts for Ford Models 69MF and 69MS, to 13.2 volts for MoPar Model 916. If tuner sweeps when power is turned on, check: 1. Defective search selector switch (Ford 69MF & 69MS E7 & E8 - MoPar 916 E7) 2. Both ends of relay actuating resistor (Ford 69MF & 69MS R34 - MoPar 916 R34) 3. Pins 6 and 8 of 12AU7 for short to ground 4. Switch contacts of relay defective (Ford 69MF & 69MS E4 - MoPar 916 E8) 5. Relay internally shorted to ground (Ford 69MF & 69MS E4 - MoPar 916 E8) If tuner sweeps after warm-up, check: 1. 12AU7 for shorts to filament or cathode If tuner remains stationary after warm-up, go to TEST 2.
2. STARTING	Disconnect the antenna for the following checks: Ford 69MF & 69MS only If tuner sweeps normally after the TOWN button is pressed and released, go to TEST 4. If tuner sweeps normally after the COUNTRY button is pressed and released, go to TEST 4. MoPar 916 only If tuner sweeps normally after the SEARCH button is pressed and released, go to TEST 4. ALL MODELS: If tuner sweeps erratically after a search selector button is pressed, go to TEST 3. If tuner does not sweep when a search selector button is depressed and the motor does not run, check: 1. Defective search selector switch (Ford 69MF & 69MS E7 & E8 - MoPar 916 E7) 2. Low B+ at relay (Ford 69MF & 69MS E4 - MoPar 916 E8) 3. Relay open (Ford 69MF & 69MS E4 - MoPar 916 E8) 4. Both ends of relay actuating resistor (Ford 69MF & 69MS R34 - MoPar 916 R34) 5. Contact switches of relay defective or dirty (Ford 69MF & 69MS E4 - MoPar 916 E8) 6. Motor speed control open (Ford 69MF & 69MS R35 - MoPar 916 R36) 7. Drive motor defective (Ford 69MF & 69MS E2 - MoPar 916 E10) 8. Motor choke coils open (Ford 69MF & 69MS L6 & L7 - MoPar 916 L7 & L8) 9. Reversing switch defective (Ford 69MF & 69MS E5 - MoPar 916 E11) If tuner sweeps but stops when the search selector button is released, check: 1. Defective 12AU7 tube 2. Delay bias resistor shorted (Ford 69MF & 69MS R33 - MoPar 916 R33) 3. Pins 1, 3 or 7 of 12AU7 for short to ground 4. Bias network grounding resistor (Ford 69MF & 69MS R28 - MoPar 916 R31) 5. Pin 3 cathode resistor of 12AU7 (Ford 69MF & 69MS R29 - MoPar 916 R27) 6. Coupling capacitor (Ford 69MF & 69MS C11 - MoPar 916 C10) If tuner does not sweep and motor runs, check: 1. Loose or misadjusted clutch and disc assembly (see Service Note No. 1) 2. Motor coupling (S) spring jarred off of motor drive shaft or broken (see Service Note No. 2) 3. Open or weak solenoid (Ford 69MF & 69MS E3 - MoPar 916 E9) 4. Control clutch bent out of shape or misadjusted (see Service Note No. 3a & 3b) 5. Section D of relay contact switch defective or dirty 6. Defective slip clutch on tuner drive shaft. 7. Crown gear and pinion defective or disengaged (see Service Note No. 4)
3. ERRATIC OPERATION	Disconnect the antenna for the following checks: If tuner sweeps to high end and stops when operated with a search selector button but the motor runs, check: 1. Radio incorrectly connected to the power source 2. Misadjustment of motor reversing switch (see Motor Reversing Switch Adjustment in the Service Manual for either the 69MF, 69MS or the 916) 3. Tuner for mechanical bind 4. Drive motor incorrectly wired (see Service Note No. 5) If tuner sweeps to low end and stops when operated with a search selector button but the motor runs, check: 1. Radio incorrectly connected to the power source 2. Misadjustment of motor reversing switch (see Motor Reversing Switch Adjustment in the Service Manual for either the 69MF, 69MS or the 916)

TEST	INDICATIONS & INSTRUCTIONS
	If tuner sweeps normally but stops only on very strong stations when operated with a search selector button, check: 1. Low sensitivity (see Alignment Chart in Service Manual for either the 69MF, 69MS or the 916) 2. Proper adjustment of antenna trimmer 3. Poor or insufficient antenna 4. RF, conv, IF and detector tubes 5. Defective IF coupling capacitor (Ford 69MF & 69MS C12 - MoPar 916 C11) 6. AVC voltage divider resistors (Ford 69MF & 69MS R26 & R27 - MoPar 916 R24 & R25) 7. Bias network grounding resistor (Ford 69MF & 69MS R28 - MoPar 916 R31) If tuner sweeps but stops either before or after the station, check: 1. Input voltage of radio with radio installed in the car. 2. Value of bias network grounding resistor (Ford 69MF & 69MS R28 - MoPar 916 R31) 3. Pin 3 cathode resistor of 12AU7 (Ford 69MF & 69MS R29 - MoPar 916 R27) 4. IF coupling capacitor for leakage (Ford 69MF & 69MS C12 - MoPar 916 C11) 5. Sticky relay contacts 6. Sticky control clutch 7. Misadjustment of motor speed control (see Motor Speed Adjustment in the Service Manual for either the 69MF, 69MS or the 916) 8. Tension spring of control clutch (see Service Note No. 3b) 9. IF alignment 10. Binding manual tuning shaft 11. Binding gears in search unit; all gears must be free and have .003 to .010 end play 12. Tuner drive shaft must have sufficient end play (see To Replace Tuner Drive Shaft)